

## CHAPTER 1.5 Preparation of the recipient for kidney transplantation

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### 1 Special aspects and general assessments

#### Special aspects of paediatric kidney transplantation

- In Germany, paediatric patients with an eGFR < 20 mL/min/1.73 m<sup>2</sup> can already be registered with Eurotransplant for pre-emptive kidney transplantation [1].
- Kidney transplantation from a living related donor (e.g. one of the parents) should be discussed and assessed in advance (note: better graft survival and lower complication rate with pre-emptive living donor transplantation).
- A detailed donor profile often needs to be defined in terms of body height, underlying disease, special anatomical characteristics, etc.
- Where appropriate, the risk of disease recurrence in the transplanted kidney (e.g. FSGS, IgA nephritis, aHUS) should be considered when choosing between living and deceased donation.
- In paediatric transplant recipients, histocompatibility and avoidance of sensitisation are of particular interest in view of the expected need for repeated kidney transplantations during their lifetime.
- Modalities of fluid, nutrition and medication intake are of particular interest in children, considering, for example, the inability to swallow tablets or the need for tube feeding.
- The cognitive maturity of the paediatric patient and the willingness and ability of the parents/caregivers to support their child have a significant impact on adherence to treatment (note: assessment of need for support by care services and/or youth services).

- An individual treatment concept for each recipient should be defined by an interdisciplinary agreement with paediatric nephrology, transplant surgery, urology, immunology, etc.
- Prior to transplantation, a personalised immunosuppressive regimen should be planned for each paediatric recipient, taking into account age, comorbidities and individual risk of infection, rejection, disease recurrence, etc.
- Detailed education of paediatric patients and their parents/caregivers (including psychosocial counselling) is essential to improve adherence and avoid complications after transplantation.

#### **Timing for initiation of preparation for pediatric kidney transplantation**

- If possible before starting chronic dialysis therapy (e.g. with an eGFR of around 20–25 mL/min/1.73 m<sup>2</sup>), in order to allow pre-emptive registration on the Eurotransplant waiting list (with an eGFR < 20 mL/min/1.73 m<sup>2</sup>) and/or to realize a pre-emptive living donor kidney transplantation.

#### **General assessments**

- If not already done clarification of underlying renal disease (e.g. genetics)
- Assessment of co-morbidities (e.g. portal hypertension due to chronic liver disease, diabetes mellitus, heart disease, lung disease, neurological impairment, additional malformations, etc.)
- Documentation of co-medication (with regard to possible interactions with the immunosuppressive drugs)
- Documentation of pre-existing allergies
- Documentation of previous blood transfusions
- Documentation of immunisation status
- Assessment of vaccination status (recommendation: complete pre-transplant vaccination status, especially live vaccinations!)
- Documentation of residual diuresis volume
- Clarification of (medical) custody

#### **Aspects for planning of the individual surgical procedure**

- Urological aspects: urogenital malformations, bladder dysfunction, ureterocutaneostomy, etc.
- Evaluation of the indication for nephrectomy of the native kidneys (e.g. increased risk of Wilms tumour).
- Assessment of the need for explantation of previous kidney transplants, if applicable.

## 1 Preparation for kidney transplantation

- Vascular malformations/thrombosis/stenosis:
  - ♦ Abdominal vascular malformations/thrombosis/stenosis related to the vascular anastomosis of the transplant.
  - ♦ Cervical vascular malformations/thrombosis/stenosis related to a central line for laboratory controls, fluid management, etc.
- Dialysis access management: e.g. peritoneal catheter extirpation during or after transplantation.
- Where appropriate assessment of the possibility/need for combined liver and kidney transplantation (e.g. autosomal recessive polycystic kidney disease [ARPKD]).

## 2 Diagnostics

### Physical examination

- Height, weight, head circumference (if appropriate)
- Full physical examination including pubertal status (skeletal deformities? reduced mobility?)

### Laboratory diagnostics

- Complete blood count (including leukocyte differential count and reticulocytes)
- Blood gas analysis
- Electrolytes (sodium, potassium, chloride, calcium, magnesium, phosphate), creatinine, urea, uric acid, cystatin C, creatine kinase (CK), GOT (ASAT), GPT (ALAT), GLDH, alkaline phosphatase (AP), gamma GT, total bilirubin, direct bilirubin, LDH, amylase, lipase, glucose, total protein, albumin, C-reactive protein (CRP), iron, ferritin, transferrin, transferrin saturation, triglycerides, total cholesterol, LDL cholesterol, HDL cholesterol, lipoprotein (a), homocysteine
- Immunoglobulins (IgA, IgG, IgM, IgE)
- Endocrinology: TSH, fT4, fT3, IGF-I, IGFBP-3, parathyroid hormone (PTH), 25-OH vitamin D, HbA1c, LH, FSH, testosterone ♂ or estradiol ♀
- Coagulation: prothrombin time (Quick), aPTT, thrombin time, fibrinogen, antithrombin III (ATIII), factor II, factor V, factor VIII
- Thrombophilia diagnostics: protein C, protein S, MTHFR mutation, factor II mutation, factor V mutation, activated protein C resistance (APC)

resistance), lupus anticoagulants, anti-phospholipid antibodies (e.g. anti-cardiolipin, anti-beta-2-glycoprotein I, anti-phosphatidylserine)

- Blood group
- HLA typing (note: Confirmation by HLA re-typing in another blood sample required!)
- HLA antibody screening (note: Repeat every 3 months!)
- Virology: HIV-1/2 screening, anti-HAV, HBs-Ag, anti-HBs, anti-HBc, anti-HCV, anti-CMV, CMV-DNA, anti-EBV, EBV-DNA, anti-HSV, anti-VZV, anti-measles, anti-mumps, anti-rubella
- QuantiFERON test (interferon-gamma release assay; if  $\geq 5$  years) or tuberculin skin test (if  $< 5$  years)
- As appropriate extended (auto-)immune diagnostics and complement diagnostics (e.g. in autoimmune diseases, haemolytic uraemic syndrome)
- Urinalysis: urine status, urine culture, urine creatinine, urine protein, urine albumin, urine alpha-1 microglobuline, urine calcium, urine glucose

### Instrumental diagnostics

- Abdominal ultrasound (including Doppler ultrasound of the aorta, vena cava inferior and iliac vessels); (if necessary) abdominal MRI (especially in case of very young children with small abdominal vessels)
- Doppler ultrasound of the neck vessels (note: repeat after each central venous catheter!)
- Ultrasound of the urinary tract (measurement of residual urine)
- As required extended urological diagnostics: uroflowmetry, micturition cystourethrogram (MCU), cystoscopy, cystomanometry
- Chest x-ray
- X-ray of the left hand (bone mineralisation, bone ageing)
- Echocardiography (ECHO), electrocardiogram (ECG)
- 24-hour ambulatory blood pressure monitoring (ABPM)
- Audiometry
- Electroencephalogram (EEG)
- Pulmonary function tests (PFTs) (if the child is cooperative)

### Further diagnostics

- Ophthalmologic examination including fundoscopy (hypertensive retinopathy? cataracts?)
- ENT (ear, nose and throat) examination (looking for focus of infection)
- Dental examination (looking for focus of infection)

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- Gynaecological examination (if applicable)
- Psychosocial assessment
- Neuropsychological assessment (developmental diagnostics)
- Neurological evaluation (if appropriate)
- Hepatic and/or gastrointestinal evaluation including endoscopic examination (if appropriate)

All dynamic examination results (laboratory parameters, imaging after specific events) should be repeated regularly.

## References

- 1 Richtlinien der Bundesärztekammer für die Wartelistenführung und Organvermittlung zur Nierentransplantation (gemäß § 16 Abs. 1 S. 1 Nrn. 2 und 5 TPG): <https://www.bundesaerztekammer.de/baek/ueber-uns/richtlinien-leitlinien-empfehlungen-und-stellungnahmen/transplantationsmedizin/wartelistenfuehrung-und-organvermittlung> (Stand 27.06.2023)